



Climate Change Adaptation (CCA) of SMEs

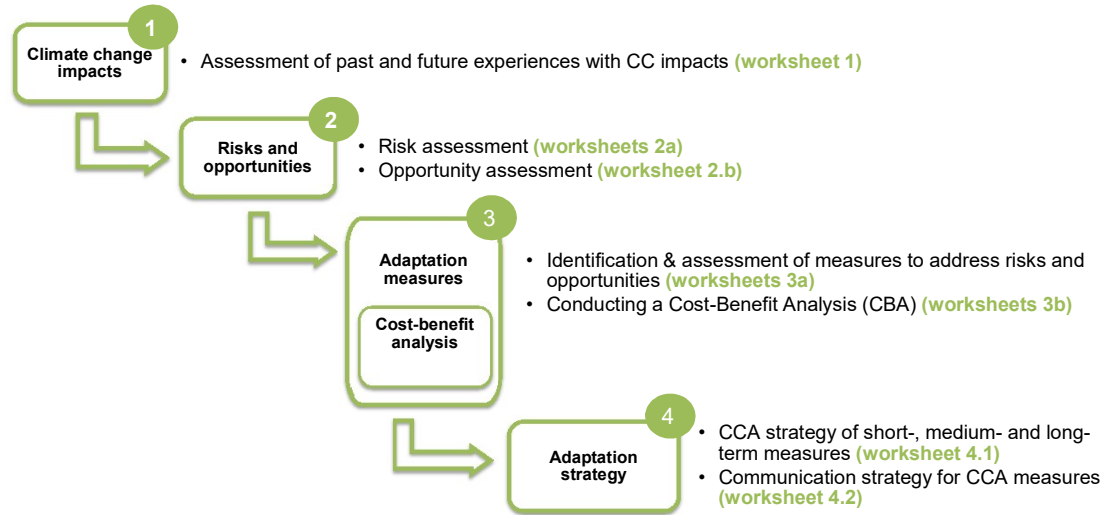
Climate Expert Worksheets for CCA Strategy Development - Version: Dec 2018

The worksheets and underlying methodology presented in this Excel tool seek to support small and medium enterprises (SMEs) in **assessing climate-related risks, identifying opportunities and developing adaptation strategies**. They can be used by **companies** independently, by **consultants** supporting SMEs in developing a CCA strategy, or by **trainers** implementing awareness raising and or strategy development workshops with companies or consultants.

The methodology and worksheets have been developed within a series of projects on CCA and SME competitiveness by the **Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH** and its knowledge partner **adelphi** on behalf of the **German Federal Ministry for Economic Cooperation and Development (BMZ)**.

Overview on the methodology and tools

The worksheets build on a **four-step methodology** for developing a CCA strategy of SMEs. The **worksheets** facilitate the practical implementation of each step:



Time required	Company resources	Location of assessment

Technical notes

- The worksheets are provided in **printer-ready** format.
- All worksheets contain **comments** with suggestions on how to conduct the particular assessments. The comments can be shown through the function "show/hide comments"
- The worksheets can be adapted to specific company contexts, i.e. **texts can be changed and assessment categories can be added**.
- If using the tool, please make sure that **GIZ is mentioned as original creator** and that the GIZ's logo is displayed.
- If possible, please also **inform the GIZ** about the use of the tool (e-mails should be addressed to Sebastian Homm, sebastian.homm@giz.de).
- The most recent version of the Excel Tool will always be available on the **Climate Expert website** (www.climate-expert.org).

Additional material




To support SMEs and training organisations in applying the methodology and tools, **capacity building material** has been developed featuring:




- ✓ Real and fictitious **case studies** describing climate change effects and adaptation measures
- ✓ A **Manual** which explains in detail how the methodology and worksheets can be applied in a company setting
- ✓ Material for **awareness raising** and training of consultants (upon request)

Tools are available for usage or download on the **Climate Expert Website** (www.climate-expert.org).

Assessment grid

Note: The "Assessment grid" is a simple but comprehensive tool to assess a company's vulnerability to climate change. This sheet can also be used as a stand-alone tool for a short assessment with a company.

Impact area		Critical points	Answers / comments	Importance	Ideas on measures for addressing risk / opportunity
Infrastructure and operations	 Building / Location	1	Are existing buildings resistant enough to withstand climate change (slow onset changes, extreme weather events)?		
		2	How sensitive is the company location to climate change impacts?		
		3	Is infrastructure close to the premises sensitive to changing climate and extreme weather events?		
		4	How linked is the company with neighbouring companies? (resources, infrastructure, joint efforts)		
		5	How linked is the company with the community? (resources, infrastructure, joint efforts)		
	 Processes	6	Is the energy supply secure?		
		7	Is the water supply secure?		
		8	How sensitive are manufacturing processes to uncertain energy and water supply?		
		9	How sensitive are manufacturing processes to extreme weather events (e.g. high temperatures, heavy rain etc.)?		
	 Logistics and stock	10	Is the availability of raw material and auxiliary material affected by climate change impacts?		
		11	Is there enough flexibility in transport and delivery of goods in case of climate change impacts?		
		12	Is there any possibility to reduce raw material and product miles and/or reduce complexity of value chain?		
		13	Is the storage of goods secure in case of changing conditions (e.g. higher temperatures) or other climate change impacts (e.g. flooding)?		

Stakeholders	 Employees and community	14	Do working conditions deteriorate due to climate change impacts?			
		15	Do living conditions of workers deteriorate due to climate change impacts?			
		16	Are there any impacts on productivity caused by temperature rise or extreme weather events?			
		17	How severely is the community (estate population and surrounding communities) affected by climate change, and by the company's adaptation or maladaptation?			
		18	Are there any possibilities to help adapt and/or raise stability of energy/water supply in the community in a joint effort (PPP)?			
	 Government and regulation	19	Have past direct climate change impacts already affected regulations that your company has to comply with?			
		20	Are there any regulations that you anticipate or expect to become more stringent in the future?			
		21	Is your company affected by any existing government programmes (e.g., National Missions) or funding streams?			
22		Are there any government programmes regarding adaptation to be anticipated, or that your company could lobby for?				
Finance and market	 Market	23	Is there any falling or rising demand of produced products caused by climate change?			
		24	Are there increasing expectations / standards of purchasers and / or end-consumers in terms of climate change adaptation efforts?			
		25	Are there any impacts on product accessibility?			
		26	Is there any opportunity to extend or adapt product portfolio to climate change impacts?			
	 Finance	27	Do climate change impacts cause any problems regarding short-term cash-flow and financing?			
		28	Do climate change impacts cause any problems for long-term investments?			
		29	Is it likely that climate change impacts will cause your company's liabilities to increase? (e.g., flooding resulting in toxic discharge)			
		30	Are insurance premia likely to be raised due to climate change impacts and / or are the existing insurances still adequate?			

Company Key Facts		
#	Framework conditions for Assessment	Comments
1	What is the complete name of your company?	
2	When was your company established?	
3	What are your most important products and / or services?	
4	Please name the five most important resources/raw material inputs for your production process (e.g. electricity, labour, chemicals, etc.)	
5	Please state the number of employees (skilled / semi-skilled / unskilled)	
6	Please describe who your main customers are	
7	Please describe who your main raw material suppliers are	
8	What was your annual turnover last year?	

Past and future impacts

#	Climate phenomenon	Point in time	Climate impacts	Experienced negative or positive effects on the company	Subsequent measures taken	Future trend	Notes and comments
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							

Risk assessment

2a - Risk assessment

#	Climate impact	Negative business effect in the future	Description	Timeframe considered	Probability: How likely is it that the negative business effect will occur? Magnitude: How extensive is the expected business effect when it occurs? Risk (likelihood * magnitude of negative business effect)			Prio	Notes and comments
					P	M	R		
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									

Risk matrix

MAGNITUDE (M) OF NEGATIVE EFFECT ON BUSINESS	5 - Very high					
	4 - High					
	3 - Medium					
	2 - Low					
	1 - Very low					
		1 - Very low	2 - Low	3 - Medium	4 - High	5 - Very high
		PROBABILITY (P)				

Legend: Priority C (low / medium) Priority B (medium / high) Priority A (high / very high)

New business opportunities

#	Climate phenomenon	Expected changes in markets or production conditions	Business opportunity	Type of product / service innovation			Timing / urgency	Notes and comments
				Has properties with reduced climate vulnerability	Facilitates adaptation	Other		
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								

List of measures for addressing new business and market opportunities

#	Opportunity	Timing / urgency	Additional profits (*2)	Technical feasibility	Organisational feasibility	If necessary, add further columns	Sum	Prio	Notes and comments
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									

COSTS of adaptation measures

Currency	
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Negative business effect	
Adaptation measure	

Year	I. Investment Costs				II. Operating Costs						Undiscounted total costs per year		
	From	To	From	To	From	To	From	To	From	To	From	To	Average
Now (0)											0,00	0,00	0,00
1											0,00	0,00	0,00
2											0,00	0,00	0,00
3											0,00	0,00	0,00
4											0,00	0,00	0,00
5											0,00	0,00	0,00
6											0,00	0,00	0,00
7											0,00	0,00	0,00
8											0,00	0,00	0,00
9											0,00	0,00	0,00
10											0,00	0,00	0,00
Undiscounted total costs over all years:											0,00	0,00	0,00

BENEFITS of adaptation measures (= cost savings, additional revenue)

Currency	0
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Risk	0
Adaptation measure	0

CC matrix	Impact factor	Effectiveness of measure (in %)	Annual probability (in %)
Baseline scenario	1	100%	100%
Severe scenario	1	100%	100%
Drastic scenario	1	100%	100%

Year	I. Avoided costs of the negative effect						II. Climate independent benefits				Aggregated benefits / year (considering scenarios)		
	Lost revenue		Repair / replacement		Other		Cost savings		Additional revenue		From	To	Average
	From	To	From	To	From	To	From	To	From	To			
Now (0)											0,00	0,00	0,00
1											0,00	0,00	0,00
2											0,00	0,00	0,00
3											0,00	0,00	0,00
4											0,00	0,00	0,00
5											0,00	0,00	0,00
6											0,00	0,00	0,00
7											0,00	0,00	0,00
8											0,00	0,00	0,00
9											0,00	0,00	0,00
10											0,00	0,00	0,00
Sum of undiscounted total benefits over all years:											0,00	0,00	0,00

Instructions

Step 1: Fill in the "Avoided costs of the negative effect" for 10 years.

Please fill in the costs only for the baseline scenario, even if you expect stronger climate change events to occur over the next 10 years. Higher costs caused by severe or drastic events are expressed through the impact factors!

Step 2: Fill in the CC matrix

First, all impact factors have to be filled in, then all effectiveness values, then the annual probability. See sheet "3.3b - CBA - Example" for a simple example.

Note how the results change which each step that you take!

Step 3: Fill in the "climate independent benefits"

The climate independent benefits occur independently of any climate change events. Hence, they are not affected by the CC matrix. They are simply added to the annual costs without weighting.

BENEFITS of adaptation measures: Simple example

Example of a CC matrix and benefit calculation - What do they values in the CC matrix mean?

CC matrix		Impact factor	Effectiveness of measure (in %)	Probability of the impact (in %)
Baseline CC scenario		1	100%	100%
Severe CC scenario		2,5	100%	20%
Drastic CC scenario		4,5	100%	10%

Benefit calculation	I. Avoided costs of the negative effect						II. Climate independent benefits				Aggregated benefits / year (considering scenarios)		
	Lost revenue		Repair / replacement		Other		Cost savings		Additional revenue		From	To	Average
	From	To	From	To	From	To	From	To	From	To			
Year													
1	1.000,00	1.000,00									1.500,00	1.500,00	1.500,00
2	1.000,00	1.000,00									1.500,00	1.500,00	1.500,00
3	1.000,00	1.000,00									1.500,00	1.500,00	1.500,00
4	1.000,00	1.000,00									1.500,00	1.500,00	1.500,00
5	1.000,00	1.000,00									1.500,00	1.500,00	1.500,00
6	1.000,00	1.000,00									1.500,00	1.500,00	1.500,00
7	1.000,00	1.000,00									1.500,00	1.500,00	1.500,00
8	1.000,00	1.000,00									1.500,00	1.500,00	1.500,00
9	1.000,00	1.000,00									1.500,00	1.500,00	1.500,00
10	1.000,00	1.000,00									1.500,00	1.500,00	1.500,00
Sum of undiscounted total benefits over all years:											15.000,00	15.000,00	15.000,00

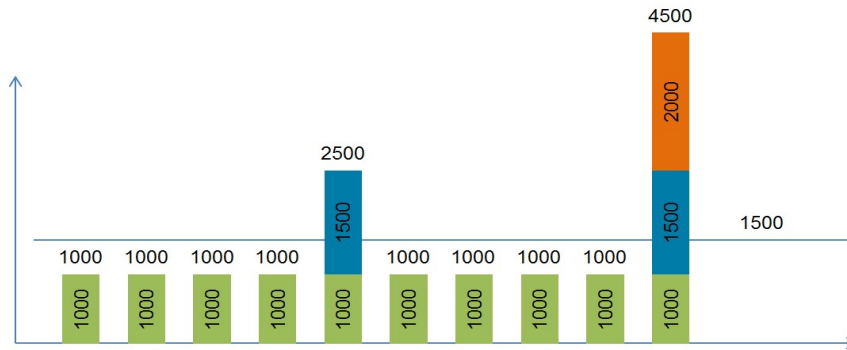
In the **baseline CC scenario**, the storm causes costs of USD 1000\$. As this is the baseline scenario, the impact factor is 1 (it would also be 1 if costs amounted to 5000\$, 7564\$ or any other amount). The storm is this strong every year and has thus an annual probability of 100%

In the **severe CC scenario**, the storm causes costs of 2500\$, so the impact factor is 2,5 (because 1000\$*2,5=2500\$). The storm is this strong every five years, so twice in 10 years. The probability that a strong storm occurs is thus 2/10=20%

In the **drastic CC scenario**, costs amount to 4500\$ and the impact factor is 4.5. The storm is this strong every ten years (annual probability = 1/10 = 10%).

The adaptation measure will help to completely avoid the negative effects of the storm, even in the strong and drastic scenarios. The measure is thus 100% effective for all three scenarios.

Illustration of the aggregated benefits per year (considering scenarios) - How are they calculated?



The **annual benefits** are calculated by multiplying the cost for the baseline scenario by the subtracted **impact factor (I)**, the **effectiveness (E)** of the measure and the annual **probability (P)** of the impact. Then, the climate-independent benefits are added.

* The impact factor has to be subtracted from the previous one because we are looking only at the **additional** costs of the severe and drastic scenarios. There is only 1 storm / year (baseline, severe OR drastic).

Since in this example, the **effectiveness** of the adaptation measure is always 100%, it can be disregarded in the calculation.

The **climate-independent benefits** are also disregarded as they are 0. If they were >0, they would be added to the annual costs. They would not be weighted by probability and effectiveness, as they are not affected by climate change.

Benefit in Year 1 (formula)	(Av. Cost Year 1 * I1 * E1 * P1)	+ (Av. Cost Year 1 * (I2-I1) * E2 * P2)	+ (Av. Cost Year 1 * (I3-I2) * E3 * P3)	+ CC-indep. benefits Year 1	= Benefit / year 1
Benefit in Year 1 (calculation)	(1000\$ * 1 * 100% * 100%)	+ (1000 * (2,5-1) * 100% * 20%)	+ (1000\$ * (4,5-2,5) * 100% * 10%)	+ 0	= 1500\$
	1000\$	+ 300\$	+ 200\$	+ 0	

RESULTS of the Cost-Benefit Analysis

Currency	0
Discount Rate	3%

Risk	0
Adaptation measure	0

Year	Discount Factor	Discounted total costs per year			Discounted total benefits per year		
		From	To	Average	From	To	Average
Now (0)	1,00	0,00	0,00	0,00	0,00	0,00	0,00
1	0,97	0,00	0,00	0,00	0,00	0,00	0,00
2	0,94	0,00	0,00	0,00	0,00	0,00	0,00
3	0,92	0,00	0,00	0,00	0,00	0,00	0,00
4	0,89	0,00	0,00	0,00	0,00	0,00	0,00
5	0,86	0,00	0,00	0,00	0,00	0,00	0,00
6	0,84	0,00	0,00	0,00	0,00	0,00	0,00
7	0,81	0,00	0,00	0,00	0,00	0,00	0,00
8	0,79	0,00	0,00	0,00	0,00	0,00	0,00
9	0,77	0,00	0,00	0,00	0,00	0,00	0,00
10	0,74	0,00	0,00	0,00	0,00	0,00	0,00
Sum over years:		0,00	0,00	0,00	0,00	0,00	0,00

	From	To	Average
Net Present Value (NPV):	-	-	-
Cost-Benefit-Ratio (CBR)	#DIV/0!	#DIV/0!	#DIV/0!
Internal Rate of Return (IRR):	#ZÄHL!	#ZÄHL!	#ZÄHL!
Return on Investment (RoI):	#DIV/0!	#DIV/0!	#DIV/0!
Payback Time (in years)	1	1	1

Adaptation strategy

Short-term adaptation measures to be implemented (implementation period: immediately)

#	Adaptation measure / Opportunity	Prio	Ranking of measure according to CBA	Potential barriers and conflicts	Ideas for overcoming barriers	Integration possibility	Success indicators / Monitoring activities	Further relevant indicator to be considered	Notes and comments
1									
2									
3									

Medium-term adaptation measures to be implemented (implementation period: years 2-3)

#	Adaptation measure / Opportunity	Prio	Ranking of measure according to CBA	Potential barriers and conflicts	Ideas for overcoming barriers	Integration possibility	Success indicators / Monitoring activities	Further relevant indicator to be considered	Notes and comments
1									
2									
3									

Long-term adaptation measures to be implemented (implementation period: years 4-8)

#	Adaptation measure / Opportunity	Prio	Ranking of measure according to CBA	Potential barriers and conflicts	Ideas for overcoming barriers	Integration possibility	Success indicators / Monitoring activities	Further relevant indicator to be considered	Notes and comments
1									
2									
3									

Communication plan**Internal communication**

#	Issue / message to communicate	Target group	Aim	Means of communication	Time / frequency	Responsibility
1						
2						
3						
4						
5						

External communication

#	Issue / message to communicate	Target group	Aim	Means of communication	Time / frequency	Responsibility
1						
2						
3						
4						
5						